OBJECTIVES

Shipboard Research:

1. Conduct a survey in the AMLR study area during Legs I and II to map meso-scale features of the dispersion of krill, water mass structure, phytoplankton biomass and productivity and zooplankton constituents using the R/V *Yuzhmorgeologiya*.
2. Estimate abundance and dispersion of krill and krill larvae in the AMLR sturdy area.
3. Calibrate the shipboard acoustic system in Admiralty Bay, King George Island near the beginning of Leg I, and again at Admiralty Bay near the end of Leg II.
4. Conduct an Antarctic fur seal pup survey at selected sites around the South Shetland Islands to provide estimates of pup abundance and distribution.
5. Conduct a high-resolution survey for krill in the vicinity of Cape Shirreff using a specially equipped Zodiac for the inshore areas and the *Yuzhmorgeologiya* for the offshore areas.
6. Deploy two buoys, instrumented with acoustical sensors and buoy-to-shore telemetry in the vicinity of Cape Shirreff.
7. Collect multi-scattering total target strength (TTS) measurements of live animals.
8. Collect continuous measurements of the research ship's position, water depth, sea surface temperature, salinity, turbidity, fluorescence, air temperature, barometric pressure, relative humidity, and wind speed and direction.
9. Provide logistical support to two land-based field sites: Cape Shirreff (Livingston Island), and Copacabana field camp (Admiralty Bay, King George Island).

Land-based Research:

Cape Shirreff

1. Estimate chinstrap and gentoo penguin breeding population size.
2. Band 1,000 chinstrap and 200 gentoo penguin chicks for future demographic studies.
3. Record at sea foraging locations for chinstrap penguins during their chick-rearing period using ARGOS satellite-linked transmitters (PTT's).
4. Determine chinstrap and gentoo penguin breeding success.
5. Determine chinstrap and gentoo penguin chick weights at fledging.
6. Determine chinstrap and gentoo penguin diet composition, meal size, and krill length/frequency distributions via stomach lavage.
7. Determine chinstrap and gentoo penguin breeding chronologies.
8. Deploy time-depth recorders (TDR's) on chinstrap and gentoo penguins during chick rearing for diving studies.
9. Collect data on foraging locations (using PTT's) and foraging depths (using TDR's) of chinstrap penguins while concurrently collecting acoustically derived krill biomass and location data during the inshore survey.
10. Deploy PTT's on chinstrap penguins following adult molt to determine migration routes and winter foraging areas in the Scotia Sea region.
11. Document Antarctic fur seal pup production for Cape Shirreff and assist Chilean

colleagues with censuses of fur seal pups for the entire Cape and the San Telmo Islands.

12. Monitor female Antarctic fur seal attendance behavior.
13. Collaborate with Chilean researchers in collecting Antarctic fur seal pup length, girth, and mass for 100 pups every two weeks through the season.
14. Collect 10 Antarctic fur seal scat samples every week for diet studies.
15. Collect a milk sample at each female Antarctic fur seal capture for fatty acid signature analysis and diet studies.
16. Record at-sea foraging locations for female Antarctic fur seals using Platform Terminal Transmitters (PTT).
17. Deploy time-depth recorders (TDR) on female Antarctic fur seals for diving studies.
18. Measure at-sea metabolic rates and foraging energetics of lactating Antarctic fur seals using doubly-labeled water.
19. Tag 500 Antarctic fur seal pups for future demographic studies.
20. Measure metabolic rates and thermo-neutral zones of pups and juvenile Antarctic fur seals using a metabolic chamber.
21. Collect teeth from selected Antarctic fur seals for age determination and other demographic studies.
22. Deploy a weather station for continuous recording of wind speed, wind direction, ambient temperature, humidity, and barometric pressure.